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ABSTRACT

Three years of helping faculty members at a state university learn computing technology yielded the following lessons: (1) for faculty members, the ownership of a computer is an emotional event during which computers are viewed successively as glorified typewriters, status symbols, and tools; (2) even to highly knowledgeable individuals, learning to use computers is often a frightening and ego-threatening act; (3) depending on their use of technology and impetus for learning, individuals learning computing technology may be classified as early innovators, early adopters, early majority, late majority, or laggards; (4) introducing computing innovations is an individual effort; and (5) the seeds for computing innovation sometimes come from a group synergy. The following implications emerged from an analysis of the experiences of four faculty members attempting to learn computer technology: learning is based in the ego of the learner; learning is based in individual needs, interests, and timing of need to learn; learning of computing technology is based in skills and knowledge of self-directed learning; learning is an instrumental and expressive act of learning both the object of action in technology and its application and integration into life actions; and for some, learning is influenced by the resource environment. (MN)

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The Agony and the Ecstasy of Adult Learning: Faculty Learning Computing Technology

What lessons can we learn from these experiences?

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Introduction

At the heart of an adult educator is the experience and the reflection on adult learning. In particular, while I have been actively engaged in encouragement faculty growth in computing, I have been intrigued with the lack of literature and of lack of complexity in discussions regarding faculty development in computing technology. We are all faced with these issues; however, our own personal and professional efforts give little illumination in the process. This paper is a synthesis presentation of critical reflections from an action research project on my professional and personal involvement in helping other adult learners to engage and utilize computing technology in faculty roles. Because of the complexity of exploring adult learning and the development of knowledge and skills in computing technology, this presentation brings together a triangulation of organizational perspectives, individual beliefs and actions, and related adult learning principles. These observations reflect a period of three years of organizational development creating infrastructure development and faculty development in their use of technology incentives. What has been observed and learned about adult learning through these experiences will be explored and highlighted from an organizational and personal set of experiences. From the individual frame I will share four learning profiles of faculty who were novices and have moved into moderate to advanced computer use status. Each faculty member was asked to reflect upon their journey, their key ways of learning, and their key beliefs about that process. Lastly, I provide a summation of guiding adult learning principles which highlight the key catalysts and supports for faculty in a computing technology world.

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National Context for Faculty Computing Activities

As I began this action project, I became aware of the key influences outside the college, the university and the classroom relating to the computing world. Although most faculty do not latch onto new fads, it is evident that instructional computing has become a growing phenomenon on college campus. Further, any examination of adult learning in relation to technological innovations clearly has an interactive sociological context. Although each individual, academic program, college and university are in different cultural places for the infusion of technological resources and environment press for faculty to engage in computing, one report establishes several landmarks about the national scene of faculty computing. As noted from this recent report,

> "This year's survey (1997) reveals that almost one-third (32.8 percent) of all college courses use E-mail, up from 25 percent in 1996 and 8 percent in 1994. Fully one-fourth (24.8) of all classes draw on resources available on the Internet, compared to 15.3 percent in 1996. And more than an eighth (23.4 percent) of all college courses use some form of multimedia resources, up from 8.4 percent in 1996 and 4 percent in 1994" (Gilbert, S., 1997, 14 October). AAHESGIT201: Campus Computing Survey Summary. *American Association for Higher Education* [On-Line].Available E-mail:Aahesgit@list.cren.net [14 October 1997].

In 1995, this similar survey reported that:

...the proportion of college courses using some form of information technology resource rose significantly between 1994 and 1995, increasing by at least one-half and in some cases doubling. The dramatic one-year gains shown in Chart 1 [note attached] represent important changes in the way growing numbers of faculty across all types of institutions and in all disciplines develop their courses, select content for the syllabus, present materials in class, structure course assignments, and evaluate student performance (Green, 1996, p. 26)

Technology has become a more significant partner with faculty instructional activities. As with this national scene discussion, I have observed similar changes within my own campus. Equally significant, this phenomenon can also be observed within the personal home front; computing has moved into the home, into the child and family context, and into interpersonal relationships. It has moved onto the TV screen with TV programs exploring computing and the internet, and it has moved into neighborhood conversations and Xmas card letters discussions.

And it has become a medium for initial contacts, dating, and exchange of personal knowledge. No longer a highly esoteric application for the few, computing has become a medium of diverse activities for the many. Yet in this context, faculty have followed their own unique paths to their own unique drum beats.

Lessons from the Organization Perspective

During the past three to four years in organizational leadership, I have identified five major lessons in providing organizational leadership and encouragement for using computing technology in an organization.

Lesson One: A Perk, a Status Symbol, or a Tool:

Lesson Two: Learning as a Frightening and Ego-threatening Act:

Lesson Three: The Teachable/Learnable Moment:

Lesson Four: Faculty as a Leaderless Orchestra:

Lesson Five: Learning with a Pack of Innovators:

Lesson One: A Perk, a Status Symbol, or a Tool: The ownership of a computer is an emotional event.

One of the first and sometimes most volatile lessons I learned was the multiple beliefs and perceptions of computing technology by individuals as its impacted organizational support and allocation. I have observed and documented the following four stages of public discourse by faculty members and department leaders which have reflected their varied beliefs about computing technology as a working support resource and a concrete financial commitment by the organization to their professional lives and to the interior of their office activities. Although these four stages of public discourse have a chronological time line in presentation, they also reflect belief systems of faculty and administrators *vis-à-vis* the computer.

Stage One: Glorified typewriter. This first stage reflected individuals who believed that a computer and an expectation for changing the lives of individual faculty were like the discussions of other previous technology which would revolutionize the world...and didn't. They saw it as a technology which would gather dust and be of minimal use. Many viewed the computer as a glorified typewriter, worthy for the secretaries, but of minimal use and of no interest to many faculty.

From an organizational perspective, this stage also reflected stakeholder beliefs and environmental lack of press towards computing. Those in this stage would question expenditures for computer equipment, when the funds could be expended in other "higher priority" items of interest to the department. Some viewed computers as valuable for specialized applications, such as statistics or programming language, but questioned its use in the day-to-day lives of faculty and students. One of the key drawbacks for many departmental leaders towards the movement in computer use was often the skill of keyboarding--a skill learned by many in high school for using typewriters...but not one typically learned at an earlier age by our senior faculty. Thus, when computers went onto desks of faculty, they often became "terminals for E-mail use." Faculty writing continued via Dictaphone or yellow-pads and these individuals blissfully ignored the ongoing computing interests of their students and colleagues.

Stage Two: I am just as important, as he is! The second stage in this organizational process of movement towards greater computing activities and of a personal belief system towards a more pervasive use of computer was one of emotional ego regarding the allocation of a computer. When my college began to focus upon technology, a new ethos rose from individual faculty and their beliefs of the symbolism of allocating computers. When the college designated a small pool of funds to begin to upgrade, each department was allocated funds and asked to designate one or several faculty member(s) for receipt of equipment. In three of the seven departments, I faced angry senior faculty members who were not given equipment, while another one of their colleagues was slated for new equipment. Although the process of selection by the department heads had been discussed with these respective faculty members, it was evident that the allocation of resources to a select few was viewed as a merit reward by the department. In each of the cases, the allocation was to a faculty member who was going to make more focused use of the computer for his/her work. However, the aggrieved faculty member who was not slated for equipment viewed the equipment allocation felt slighted in reputation and worth. For these individuals, the computer was viewed as a status symbol and as a perk. However, the notion of utilizing the computer for its intended purposes was rarely part of these concerns. Thus, the computer hardware became a emotional symbol of organizational valuing of the individual.

Stage Three: If I have it, I can change my world. In more recent times, the public discourse and a subset of personal belief systems of faculty has dramatically changed from the earlier two stages. Faculty who desired new computers now use a different set of strategies and different language regarding the instructional computing. They now could vocalize to others ways they would make better use of more advanced technology. Thus, the public discourse surrounding computing needs and allocations has become one of the organization "holding" back or supporting this individual to move forward in their agendas. In the majority of cases, the discourse had become one of desired "empowerment," while the reality for many faculty was desiring a symbol of worth similar to others who were already given better computing resources.

Stage Four: We are doing "X activities" and need more computing assistance. This fourth stage has been reflected in a subset of individuals, as well as a number of clusters of program faculty at our college who communicated their need for computing resources, while also demonstrating established commitments and knowledge in computing. In each case, one or more individuals reflected passion and interest for the applications of computing technology for instruction, administrative applications, and research. This stage was represented in the earliest of efforts of infusion of computing technology in the college and continued to be represented by independent individuals, as well as growing numbers of small groups of the organization who found unique applications for their activities in computing technology. The notion of a computer as a resource tool was often presented in more creative and specific ways, and these individuals tended to be more outwardly engaged in connections with others with computing expertise. Often these individuals acted on their needs without internal organizational assistance...but often with other university and external sources beyond the college with greater expertise or knowledge of valued specific applications for content area. This group demonstrated high initiative and self-directed learning. And this group problem-solved and articulated their computing needs in very unique and specific ways. Often these folks were the early innovators and early adopters. However, recently, I have experienced several moderate adopters utilizing this language.

In this first lesson learned [in stages of development of organizational knowledge and use], faculty and their organizational fiefdoms view the infusion of computers and computing

technology from a highly particularistic and personalized perspective. It would appear that these various stages reflect both the state of the college and university *vis-à-vis* the computing resources available to faculty, as well as faculty member's knowledge of computing. It also reflects how faculty members make meaning of a new symbol and practice of unknown substance and impact. Leadership must recognize that individuals who have limited functional understanding of the hardware, its possibilities, and its future assistance to the individual will not view these efforts from a higher plane of organizational needs. Thus, the first lesson learned was that organizational dynamics of computing resources were focused upon emotional status, rewards, and perks. Computing resources for the few of those engaged in technological innovation did view it as a "tool" and as "support resource" for their work. Thus, computers and computing innovation often presents a myriad of meanings to faculty with little connection to organizational perspectives and initiatives.

Lesson Two: Learning Computing by Highly Knowledgeable Individuals is Often a Frightening and Ego-threatening Act.

I continue to be humbled by the confessions of highly competent faculty who view learning new computing applications as ego-threatening. They often live lives of the mind...rather than working with their hands at concrete applications. Computing has been a personal act of terror offering most of our faculty threatening and frustrating experiences. Many have suspected that their new activities on a machine may permanently damage it or that they would be found out as stupid and inept. These faculty often toil with many time-eating demands and view the risk-taking acts of learning new computing technology as questionable in relation to their current ways of doing instruction, research, or communication. For those individuals who focus on the significant technological issues of human and machine interactions, they question computing in relation to the human acts of learning and instruction. They view learning computing as the first step towards a distance education mode of impersonalization, detachment, and a brain-dead state. They believe that learning computers would make them more of a robot and machine...less human and humane. Thus, their sense of who they want to be is threatened with this philosophical perspectives on computing and their lives of ideas and human growth and learning. Many have just stalled any discussions or involvements stating they are too busy;

however, fear and insecurity and ego and reputation for being competent are the key issues. Most dislike the feelings of stupidity in gaining initial knowledge and competence with computing. They view these experiences as labeling them "illiterate," incompetence," or "foolish." For many of our faculty, finding situations in which they will be successful and be rewarded early on with computing learning has been one of the most significant efforts in the process of faculty involvement in learning computing. Those first steps in bridging self-efficacy with computing knowledge and skill are the significant difference.

Lesson Three: "The Teachable/Learnable Moment: What Stimulates Different Faculty to Learn Computing Technology?

Early in my work with faculty, I found that most faculty had limited backgrounds and were not typically in a group of computing enthusiasts. Over the last three years, I have formally and informally acted upon various efforts to see how our organization could engage faculty in learning the computing technology and to reflect upon both surprises of gained outcomes and more often from non-events of attempted learning/teaching experiences.

The historical work of Rogers (1995), *Diffusion of Innovations*, has provided significant insights in a paradigm for framing the stimulation of adult learning in computing technology. As you will recall, he researched diffusion of innovation and identified categories of individual responses to incorporate innovations into their practice: innovators, early adopters, early majority, later majority, and laggards. Note **Table One.**

From an organizational perspective, I note below a table of these categories of faculty utilizing the Rogers' typology, the nature of their technology use, and how they often either self-report or are observed as learners. I recognize that this analysis reflects a historical point in time. Yet, I have found it valuable as I have worked with faculty to aid them in their understandings and accomplishments in utilizing the computer for their desired purposes. As illustrated in this table, the "teachable/learnable moments" were different in substance, kind, and nature of scope for each of these individuals both within and across categories.

The *early innovators* were often the frontrunners and experts in the organization who did offer some support and assistance for others' learning. However, on the whole, they were "on their own islands of activity." Many of them did offer efforts to shape the organizational

agendas towards stronger technology support, but they did not view themselves as making significant commitments to mentorship or instruction for other faculty members. However, their actions did make a significant difference in the classroom...because they did model instruction through the technology. Equally important, they were often used as role models within the organization. Others looked to them to ascertain future directions for their engagement in computing, viewing their knowledgeable colleague as foresighted. Thus, these early innovators were often beacons of light upon an unknown agenda and an unknown future. The *early adopters* often were the ones who sought out selected instructional activities through the college or the university resources. These individuals also appeared to also seek out selected mentoring from others with more expertise. However, these individuals were not typically interested in global, broad based learning; thus they often reported frustration at the format, focus, and orientation of the instructional activities of workshops offered in the group context. They viewed the workshops and short courses as a way to learn enough of the language, the symbols, and the operations to then "teach themselves." When asked to critique their participation in group instructional events, they did not totally denigrate these efforts. They assumed the workshops were excellent for beginning foundational knowledge and clearly for others in the workshop; however, they often felt the workshops were inefficient--not directed targeted to their learning needs or their learning styles. These early innovators often saw themselves as experimenters, learning from trial and error. They often targeted projects or activities and attempted to learn the software of hardware and software with a particular application. These individuals believed they needed to make the application into their own usage. By the same token, they found challenges through situations in their work or through their professional associations which were catalysts for them to seek out and try newer technology. They believed they were not significantly influenced by the organization to gain greater computing competence, other than infrastructure technology access and support.

Their self-reported learning did not seem to be significantly influenced through organizational actions. Rather, they saw themselves experiencing meaningful learning through

Table One
Use of Technology and Impetus for Learning for 1995 Faculty by Categories of Innovation

Level of faculty innovator	Observed applications	Reported Impetus for learning
Early innovators	Word processing. E-mail. Spreadsheet program or data base program. Multi-media, programming language, or presentation package. Adapting technology for specific applications and needs.	Comfort with using instruments, machines, technology. In group of early innovators in discipline/research area. Curiosity and valuing of innovation for specific purposes. Seek out knowledge from any resource. Enjoy pushing the "envelope."
Early adopters	Word processing. E-mail. Spreadsheet/data base or other related computing applications by identifying specific need to be addressed more easily by computing technology.	Curiosity and moderate challenge for learning computing. Seek out some workshops and book resources. Trial and error learning is best. Observe others and learn from them. Selectively adapts and seeks out based upon needs and beliefs.
Early majority	Word processing. E-mail.	Key person or significant event stimulates need for learning, i.e., child on E-mail, colleague sending article over e-mail. Value personal mentoring and one-to-one instruction. Little interest in workshops for skill development--view them as inappropriate or too advanced for them.
Late majority	E-mail receives, but does not send. Word processing, limited, if at all.	Only act with pressure and expectations from others. Learning based on a very strong personal need to know, often fed by student connectedness.
Laggards	Have computer on ethernet.	Ignores the possibilities and only considers those actions of key importance to safety and well-being.

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their own trial and error efforts and through mentoring and collaboration with other folks who were experienced in the application.

The *early majority* and the *late majority* were the most interesting of the groups of faculty in my role as observer and facilitator. They most often were unpredictable in efforts to offer instructional support for learning basic computing skills to faculty members. Here are several strategies which appeared to have brought success with subgroups of faculty:

A) Mentoring support: Staff and graduate student computing support available to mentor and to provide one-to-one instruction. Often these efforts occurred with problem-solving of technology issues at the faculty member's desk. In particular, we found that the University movement to a new E-mail system opened up new teaching/learning moments to mentor faculty both about E-mail but also about other questions they might have about computing. We found faculty to be very shy and uncomfortable in learning new computing skills. They did not wish to appear stupid and ignorant. Within their office, they felt more at ease in starting the process of learning the "basics" and modeling it with a mentor.

B) Short workshop sessions: Workshops offered to both graduate students, staff, and faculty with a target on a one-hour skill learning session. These workshops did not attract many faculty, but we found that graduate students often mentored faculty and staff. Also graduate students provided special and safe encouragement and one-on-one support to faculty members. [However, we sometimes found that the faculty member turned the computing activities over to the graduate student and never did learn the skills.]

C) Crisis problem-solving as a teachable/learning moment: Faculty sometimes faced special issues which required immediate support action. These moments were also excellent opportunities to provide teachable/learnable moments. However, the staff needed to be sensitized to solving the immediate issue and then moving the discussion into a broader instructional next-step set of actions.

D) Environmental messages and cues as facilitation of learning: Different working groups of faculty have begun to see their tasks as being easier with computing technology support. For example, many of our faculty work groups have discovered that E-mail distribution group conversations hold value for examining certain issues. Those late majority folks who may

not have used E-mail as a sending of voice...are discovering that they can also be engaged at a limited level without significant learning time investments...and with viewing other colleagues modeling that behavior. Some faculty units have mandated that the secretaries won't type up original "yellow pad articles"; faculty writing will be handled by secretaries from diskette copies. This mandate has forced several faculty into doing their initial word processing.

The last group, the *laggards,* are frankly given their space of lack of involvement and occasionally encouraged to attempt certain basic activities. This group has been given a computer on their desk and an active E-mail account. Because the college is discovering the use of E-mail as an organizational mechanism, many of the laggards have chosen to be either isolates and not engage in E-mail, or chosen to at least be lurkers with the college discussions on E-mail. However, they march to a different drummer and the organization attempts to let them be.

Lesson Four: Faculty as a Leaderless Orchestra - Introducing Computing Innovations is an Individual Effort.

Several writers of the higher education scene have suggested that efforts to change faculty behavior is like organizing chaos in movement. Other metaphors for notions of a orchestrating a systematic change with faculty as the target would be like moving a cemetery into new configurations or like herding a group of cats. Faculty are independent creatures who do not view themselves within a hierarchical power structure responsible for organizational mandates. Change leadership for learning efforts is usually reflected in each individual's commitment to the learning process done on its own time and own agenda. As Rogers has noted through his writings and research of the length of time for adoption of a new innovation, there is no orchestration of faculty learning which will reflect later uniform outcomes.

I have had several occasions to interview clusters of faculty regarding computing innovation and their learning. I continue to be amazed at faculty thinking about their involvement in computing innovation in relation to their own personal agenda. Most don't view computing activities on the foreground of their agenda. Rather, they speak about their efforts as part of a flowing stream, in which the innovations of computing usually occur on occasional islands of need. Or it is described as a sidebar which occurs for serendipitous and internal motives. Most speak about their learning to learn a computing innovation as a commitment of

necessity and then as a need for time to act upon learning for application and reinforcement. With a few notable exceptions, most faculty do not make a commitment to continuous learning of computing innovations. Thus, like a leaderless orchestra, faculty play their own tunes to their own rhythm and their own intensity in relation to learning computing. En masse instruction for innovation is not part of the faculty cultural context for engaging in change. Further, attitudinal involvement makes each faculty member unique in their attention and their commitment to the learning process.

In faculty discussions of making commitments towards learning, many have offered certain metaphors or language to describe their belief states along the way. One of my key insights and findings from the introduction of computing innovation in my organization was the identification of three beliefs which significantly influenced their learning involvement. For most faculty, they speak to the uncertainty, of moving into an unknown, of *giving up the security of expertise*...when the old ways have served well and known. Many individuals, both faculty and staff, have demonstrated that it is often a difficult, time-consuming, and ego-stretching personal effort to learn new skills and modify one's actions. The movement from DOS to Windows for many faculty was fraught with major issues of personal competency and problematic situations for learning. For some it meant losing "competence and expertise." For others, it was the problem of "unlearning" and "relearning". There were lots of emotions and self-efficacy beliefs which impacted this process. For example, I had one faculty member, who did not want to change his word processing program until the "organization" had decided on the final word processing program which would be used for the remainder of his time on faculty. To tell him, that versions of word processing programs would continue to change every 3-5 years was frightening and unacceptable to him. He chose to stay with his early DOS program for comfort and ease.

Another key belief in public discourse is that moving into an innovation in technology means that the organization doesn't have all of the answers. Most of our faculty and staff become extremely frustrated when an issue can't be solved promptly. They want someone with expertise to tell them the right way. They don't value and support understandings of "developing expertise." Thus, having someone who already knows the answer is highly important for many

of them. They don't wish to be *"guinea pigs" of innovation.* Thus, they question any change until the organization has worked with it for awhile and has the knowledge base. Thus, the inherent tension of moving into new computing innovations, while also developing an organizational support infrastructure knowledge base is part of the dilemmas for faculty involvement, commitment, and participation. Certain faculty will purposefully hold off until the innovation has become a given in the organization.

The third key belief regarding involvement in learning reflects a calculated *investment in computing in relation to possible rewards and desirable efficient outcomes.* Often, these calculated decisions are based in external pressures from significant others or significant ideas of future competence. Most of our faculty have a full plate of commitments and possibilities. Few desire to learn for the sake of learning...they tend to be goal-oriented and pragmatic. However, that utilitarian bent manifests itself in highly diverse and unusual ways. For one faculty member, it could mean learning how to FTP an article for a journal for submission. For another faculty member, it could mean learning html, homepage design, discussion group netforums, and posting of syllabi and readings to enhance course content. Whatever the learning need, the faculty member often internally desires to have some assurance that the learning experience will provide greater competence or greater efficiency in a reasonable investment time. Because most learning of software is a multiple session event, faculty often are impatient to wait for the pieces of a working set of actions to come together. For a sub-set of our faculty, they need a focused goal for learning in one session with a utilitarian outcome of immediate use. Thus, for over 60% of my faculty, they do not seek out risk-taking activities towards computing innovation. For example, they won't engage in learning html and homepage designs until their are in an environment, where these activities are reasonably commonplace.

Lesson Five: Learning from a Pack of Innovators: Seeds for Computing Innovation sometimes come from a Group Synergy.

It is evident from observing most computing innovations and concomitant learning, that each faculty member is an individual learner with individual needs. However, from an organizational perspective I have also interacted with select groups of faculty who come together with interest in learning new applications and technologies. Each of these efforts are unique.

Typically these groups define their own learning interests and learning projects utilizing one person with greater expertise as a mentor, rather than as an instructor. These groups of individuals tend to create action projects of a circumscribed design with a projected target and application. They do not want to take the time to create a holistic learning environment and create a long-term instructional support system. However, they often work from a conceptual framework of this innovation fitting into their programmatic or instructional emphasis. For these folks with group synergy, the organization needs to offer specialized infrastructure supports in the progression of an innovative application. There are still unique individual learning needs which need to be addressed, but these synergistic group interests provide a heightened awareness and motivation for innovative movement and infusion. Some of these groups create innovation and change in spite of the inertia of others around them. Thus, the organization needs to also have a radar for groups engaged in computing innovation and their directions and related needs for learning supports and by facilitative.

Individual Learner Perspective: Profiles of Learning Journeys of Four faculty

Each adult learner is unique in the process of valuing and acquiring computing knowledge and skills. An organizational perspective, as presented above, provides one understanding of the adult learner in the process of learning computing technology. However, in my action research efforts, it was clearly evident that organizational desires and energies often didn't pick up on the subtle and more dominant belief systems of individual faculty who engaged in computing learning. To provide a richer tapestry for exploration, I interviewed four faculty members who three years ago were either not involved with use of computers or had minimal expertise. Each one presents a different perspective of their journey towards greater use and competence in computing. These presentations reflect the faculty member's voice and perspective as they spoke to their journey and decision-making actions related to learning and using computing technology.

Faculty Member One

This faculty member is a full professor in educational psychology who three years ago did not have a computer and did not want one. Philosophically he was resistant to technology and only with the threat of losing secretarial support for his writing did he take a computer and learn to use it. In hindsight, he suggested that his lack of realization was an unawareness of "future efficiency" that computing could provide to his work. Currently he is using computing for E-mail, Internet searching and retrieval, and for word processing, viewing his use based directly in his work and his professional activities. He believes he only needs those computing skills which make him more efficient and effective. In fact, he sees himself with more control of his work, more productive, and less stressed, and a better utilizer of his time and energies.

His preferred learning is based in a mentoring or tutoring situation, of a one-to-one interaction. He views himself learning day-by-day and step-by-step in small increments. As he faces computing problems, he seeks someone more knowledgeable, whether it is a colleague, a graduate student, a secretary, or college computing GA for support. These instructional mentors for Faculty Member One were valued and invited back if they slowly presented in a chronological fashion a particular operation and helped him record how to resolve the problem [he kept these steps on index cards next to his computer for ongoing reference].

Although he teaches in group environments and believes they have value for the dissemination of information, he does not value group situations for his own learning of computing. He believes that he is an analytical person who needs a similar process with lots of replications and resource help which is specific, immediate, and conveniently close. He has purposefully avoided an workshop or short course offered. He believes that most knowledgeable technology people are risk-taking and divergent in their attitude and presentation of information and skill — which does not match his particular learning style. He also doesn't value workshops and group learning situations, because they cover too many things and he is too novice in relation to others in the workshops. He values the one-to-one which allows for customized assistance to his immediate need for learning.

Faculty Member Two

This full professor in art education described the beginning of this journey three years ago as "below zero level." He viewed himself in a non-technical world of art and was actively trying not to allow technology to inflict itself upon him and others. He saw computing as too complex and depersonalizing. These negative attitudes were reflected in his belief that there weren't any applications for himself and his art; however, he did believe that computing could be of value for organizational and administrative uses--such as secretarial activities. Three years ago, as he participated on a college task force on innovative instructional activities, he became open to other ideas and possibilities, he decided to "break down his attitudes" and to finally get a new direction...to begin to live in a different century with computing. He also saw himself as having a competitive sense of wanting to be in the know. As he received an upgraded computer for himself and eventually a new machine, he saw himself becoming tenacious about wanting to learn and apply the computer to his world. He also saw himself as having faith in this world in which computing could be beneficial to himself personally and to his course instruction and his students. He also began to witness computing activities in the schools, through 21st Century classrooms, equipped with computers and peripherals for demonstrating and modeling instructional computing technology.

Currently, he uses E-mail (including active participation in the Clay Art listserv), word processing, CD-ROMs, Hypercard programs as demonstrations for his students, and a data base to keep track of his glaze mixtures. He draws upon many different strategies for learning computing and sees himself becoming a "sponge"...utilizing everyone around him in his unit and throughout the college for his own self-directed learning. He predominantly uses graduate assistants both within his unit and those who are involved in the graduate program instructional technology (IT) for his personal learning. He also utilizes these IT GA's for instruction in his classroom, where he participates as a learner. He has made extensive use of certain written manuals as references. However, for new learning, his primary learning tool is becoming efficient about asking questions, seeking out helpful advice and support, and trying out activities. In comparison to a colleague who often feels a sense of inferiority at not doing computing activities right, this faculty member suggests he is not afraid to "regress," to learn from his

mistakes, and to be patient in the learning curve. He sees it as a process thing...it will happen over time. He believes it is valuable because you get a return on your investment of time and resources.

As he reflects upon his learning efforts, he finds that he learns for himself and his own sense of curiosity. He hasn't found time to seek out workshops, but rather prefers targeting learning to his interest and knowledge level. His work with students in classroom internship experiences has also given him new insights of utilizing HyperCard programs for complex lessons in art history and of seeing the use of computer presentation programs which are better than those similar lessons presented on a chalk board. He now specifically advocates all student teaching interns have experiences with computing technology in their classrooms.

Faculty Member Three

This associate professor in Sport Management has been involved in using computers for a number of years prior to this current examination. However, she had focused upon word processing solely as doing straight text without any "bells and whistles" like paragraphs, indentation, or other things. As she reflected upon her journey these last three years to learn computer technology, she saw herself as a "computing illiterate." At that time she was working with WordStar and attempting to move into Word Perfect as a word processing program. She had twice taken a short course in Word Perfect; but continued to use WordStar, because she was always in a hurry. She felt she never had time to really learn Word Perfect. This scenario will continue to be repeated as she pursued learning but lacked time to apply workshop knowledge and skill into her own life efforts.

Currently, she is doing E-mail, word processing, Internet searching, and presentation slides for her classes. In addition, she has had her students do several computing technology related projects including an academic program Home page. This person views computing technology as phenomenal and exciting. She has actively participated in almost every workshop offered by the Innovative Technology Center training program for the last two years. However, she has had difficulty with these group learning situations. She sees herself as thinking and processing differently, like she is on a "different target and on a different page." She finds herself also asking a lot of questions and not always understanding the answers. So, after she

attends a workshop, she will seek someone out to ask questions and go through basic procedures and operations. She has found she learns and retain more information with mentoring and instruction from a GA, either in person or over the phone. She believes that she probably doesn't understand the basic logic of computing and is often under pressure to not take time to apply it and reinforce the ideas. She has attempted to use manuals but has not been able to figure them out. As one example, she desired to learn the use of PowerPoint, a presentation package. She had a project for using it for her class. She attended a workshop on it, then attempted to get special mentoring/tutoring for applications to a project. She then has had it critiqued through her own efforts or by asking a friend who is in technology for advice. She also has referred the project to other faculty for feedback and suggestions. However, she still doesn't have confidence in doing PowerPoint presentations for other classes and for her conference presentations.

She believes that there are many new opportunities with computing technology and desires to probably use a web-based discussion board for her class as her next computing project. She is fascinating with the possibilities of virtual reality of CD-ROMS and of her own possible development of a homepage. Part of her valuing of computing has come from her students who have appreciated her efforts to move beyond where other faculty are and to help them also become involved in more recent developments. Thus, this faculty member presents very paradoxical beliefs, actions, and judgements regarding her learning journey in instructional computing.

Faculty Member Four

This assistant professor in Exercise Science views herself as science-oriented and at ease in using technology. For her, hands-on learning is a natural part of the way she thinks and acts. So, five years ago, because of the lack of resources and therefore related lack of related knowledge at her other institution, she was only doing word processing and some spreadsheet and statistical applications. She had been able to design lab instruction including setting up learning stations including use of computer tutorials for her classes. However, again those activities were limited. When she arrived at our campus, she was at a perceived upper level of beginner in computing knowledge.

With her entry into our institution, the access to up-to-date equipment, ethernet hookups, and related equipment, opened up many new opportunities for her. In the last three years, she has developed a wide variety of new computing resource learning and application activities, including E-mail and word processing, spread sheet, data base, graphing programs, specialized computer-related programs for tutorials, and a major involvement in presentation package software.

In particular, she had been a key leader in using PowerPoint presentations through a projection system for all of her classes. She saw the opportunity to use PowerPoint a challenge for "juicing up the learning environment" and creating a more effective and organized presentation for classes. Through the development of PowerPoint presentations, she found that it required a lot of front end effort in preparing for classes. But this time commitment was not a high resource commitment, because she viewed it similar to typing up lecture notes which she always does. Thus, her movement into this presentation mode seemed to be the next logical step. She also believed that once she developed her courses in PowerPoint, it would be easier for her over time. Although it was a challenge to learn the use of PowerPoint to present words, pictures, and graphs, she believed that her key challenge was learning how to create enough of an image, that would not block students from listening to her lectures. She has spent many observational and reflective hours regarding the amount of information and images valuable and appropriate while still keeping the attention and involvement of the student learners. She also found that classroom illumination presented problems when students needed to take notes and the room was dark for projection purposes. So, her major learning of computing technology has not been the computing knowledge itself, rather it has been how to make effective applications of computing technology for her students. In discussions of other key learning experiences, she also noted her activities of learning Excel, a spreadsheet program for data management and graphics, to paste data from other programs into this particular application. However, learning the spreadsheet program was not her major concern in this discussion of learning--rather it was its utility and application of Excel to her work efforts.

She primarily has learned most of her computing knowledge on her own, has been involved in tutorials provided by the programs, and has been mentored by others on specific

occasions. She has had a strong support from her discipline which predominantly uses slides for professional presentations and also her own faculty group who are all involved in using the computer for personal and professional efforts This faculty group is viewed by her as a group which wants to be excellent in what it does and a group which looks for new ways to do things in creating a better learning environment. Thus, learning computing knowledge as just part of the day-to-day environment in this faculty cadre. This faculty member has probably made the most significant learning steps beyond those faculty who are dedicated to computing technology as a profession. Of interest, she sees her development as just a natural interest of her commitment to quality teaching and research. Her assessment is always "Am I doing it in the best way?"

Her next projects include a joint project with a colleague at another university which will involved learning how to share data sets through the Internet. At some point in the future, she may develop a homepage and possibly create a syllabus on-line. However, she is also cautious about the nature of her involvement and application. She doesn't want to lose the human touch in this push of technology into classroom interactions. She is very concerned about keeping quality human interactions in the learning experience.

Summary of the Individual Learning Perspective

As illuminated with these four cases, each faculty member has uniquely framed their involvement in both accessing computing and learning computing. Clearly, most of these individuals did not focus on the impact of the organization. Rather, their journey was a personal one which highlighted their predominant concerns and personal needs. Learning is an individual act of choice.

Summary and Adult learning Implications

In bringing together these organizational and individual faculty perspectives, there are a number of key adult learning principles reflected in these findings--focusing upon the efforts of an individual and an organization. These principles reflect both key findings of this research efforts but also provide guidance in future endeavors.

***Learning is Based in Ego and Self of the Learner**

Whether it be fear of touching a machine, fear of appearing stupid, or fear of failure and frustration, many faculty find learning computing and making it their own to be grounding in the

strength of their ego to be a novice in a new arena of assumed experts. Within individual journeys, it was also evident that the fusing of needed actions and computing knowledge also was a key impetus for movement into new learning. The nature of the faculty member's ego strength clearly influences their attitudes about their involvement in learning computing and their willingness to be patient with possible initial failure or limited success. Both from my observations in the action research project, as well as through the faculty interviews, faculty acted based upon their own beliefs of themselves, their repertoire of learning skills, and their personal and professional world. From the adult education literature, it is evident that prior life experiences have hindered many individuals from pursuing learning computing. What these findings illuminate, is that when one is an expert and competent in other areas of education and knowledge development, these feelings of competence and worth can be seriously threaten with inability to act and understand within a different realm of learning challenge. While for other faculty, their sense of curiosity and experimentation towards new learning was also a key stimulus.

***Learning is Based in Individual Needs, Interests, and Timing of Need to Learn**

Although all of the faculty had opportunities to participate in group workshops and short courses, most of faculty continually spoke to the value of the individual mentor and one-to-one instruction. They clearly were in unique learning paths not programmable into group sessions. Thus, organizations continue to be cost-efficient and effective with group events, yet these faculty judged these group events as not reflective of their needs and their ways of learning. Most felt that their making of meaning interfered with the "organizational presentation" of the group learning. Further, they believed that the group environment was not appropriate or supportive of their questions and lack of understandings. It was also evident that each faculty member individually pursued their own particular avenues of need for learning computing based in their personal interests. Most of these faculty were not significantly influenced by the organization. They spoke to personal connections, personal awareness, and personal projects of interest.

***Learning of Computing Technology is Based in Skills and Knowledge of Self-directed Learning**

From the faculty discussions of their learning journeys, it was evident that they framed their learning as self-directed learning projects. Thus, they had high need and value for special one-to-one customized learning supports or mentoring. Even when group learning experiences were provided, faculty members believed that their sense of learning came from opportunities to mesh new knowledge with own learning style, their immediate needs to know, and their desire to control the "flow of information" to be processed. It was also evident that some faculty members did not have a good understanding of their optimum learning conditions, while others had better developed attitudes and skills to seek out information, to work with it, to critique, and to handle possible lack of relevant learning. Those faculty who appeared to have better self-directed learning skills also presented their valuing of trial and error learning, using their classrooms as placed to learn and demonstrate computing, and of seeking out diverse sources both external and internal to themselves for their learning. Thus, for faculty who made advancements in computing knowledge, they saw it as part of an integrated learning journey in which they sought out the best teaching and learning experiences which developed their sense of skills and confidence in computing activities.

***Learning is an Instrumental and Expressive Act of Learning Both the Object of Action in Technology and then its Application and Integration into Life Actions**

For adults, they saw learning computing knowledge and skill as both the act of learning the knowledge or skill, but more significantly its application and utilization in their lives. For each of the faculty members, the value of learning was directly viewed as a reward based on its application to their worlds of writing for publication, their communication efforts through E-mail, their retrieval of current knowledge through the Internet, their instruction efforts through presentation packages and related WWW resources, and their research efforts utilizing unique avenues to present and disseminate to their professional worlds. Although they each presented shades of pragmatism, they each saw the complexity of their learning experiences to not be simply one task learned and operationalized into effective outcomes. Rather, they expressed a

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growing belief that with each advancement of knowledge, they saw rewards through greater complexity and proficiency in specific computing arenas.

***Learning for Some is Influenced by the Resource Environment**

For several of these faculty, their current levels of effort were connected directly to the availability of hardware, software, infrastructure, and computing resource support help. How to identify those faculty who will access and develop new skills and knowledge in computing continues to be a mystery. In comparing faculty with the same computing resources, some will remain in a novice state of knowledge and interest in computing while other faculty will make use of these resources and view it as a challenge to their future use. Those teachable moments are not always connected to the nature of resources available to the learner.

Relationship of these Findings to other Current Literature

Unlike earlier discussions in much of the literature of faculty and computing technology, this research project suggests that for most of these faculty, computing was viewed at a highly personal and interior belief system. For example, these findings somewhat contradict Geoghegan in his discussion of understanding faculty through the Rogers's model of diffusion of innovation. He notes that early adopters "are risk takers, more willing to experiment, generally self-sufficient, and interest in the technology itself" are different from the early majority faculty who "are concerned about the teaching/learning problem being addressed than the technology used to address it, view ease of use as critical and want proven applications with low risk of failure" [cited in Frayer, D.A. (1997, May 21)]. AAHESGIT132/2: Creating a New World of Learning Possibilities through Instructional Technology: Part Two. *American Association for Higher Education* [On-line]. Available E-mail: Aahesgit@list.cre.net.[21 May 1997]. Within my study, early majority faculty were not yet focused upon technology solely for teaching/learning. In fact, many of them who utilized technology with instruction...saw themselves as experimental and assumed their actions to bring technology into an instructional application could meet with failure.

Perhaps because the study was conducted in a college of education, the early innovators were extremely concerned with the teaching/learning paradigm and made active use of the technology for those efforts.

In a survey at Western Michigan University, Spotts and Bowman (1993) suggest that factors which influenced faculty in their use of instructional computing technology included: availability of equipment, promise of improved student learning, funds to purchase materials, compatibility with subject matter, advantages over traditional methods, increased student interest, ease of use, information on materials in their discipline, compatibility with existing course materials, university training in technology use, time to learn the technology, and comfort level with technology. Again, there is limited similarity of these factors in relation to the current research study. For this study, computing was a highly personal and intimate act. Although there were shades of these influencers, it was evident that faculty entered into computing first to becoming competent in their own right. Then, they moved it into an instructional environment.

The one valued piece of literature which informs this study is the *Rethinking University Teaching* (1993). In this text, Dr. Laurillard focuses upon understanding educational technology in relation to situated learning. Specifically in both the catalysts for engagement in learning, as well as the applications of technology to learning environments, there is a clear interaction between the psychological, the cultural, and the sociological and in a mediated context. The act of learning computing technology is the act of "making meaning" of both the learning process and then in a new frame of the application process. Until those involved in both organizational and instructional roles become aware of each individuals acts of meaning making with technology, the quality of adult learning in technology will be concealed, if not constrained. In the case of these faculty members, each valued and took a different learning path...a path we need to know of and to know of the meaning of those choices.

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